# AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

## Listing of Claims:

1        1-90 (Canceled).


1        91. (Currently amended) A method of caching a data object, comprising:

2        receiving at a first cache of a plurality of cooperating caches a first data

3    object of a domain of data objects;

4        if said first data object is owned by the first cache, storing said first data

5    object as primary content in the first cache; ~~and~~

6        if said first data object is owned by another cache in the plurality of

7    caches, determining on the basis of a set of dynamic criteria whether to store said

8    first data object as secondary content in the first cache;_and_

9        _if so, storing said first data object as secondary content in the first cache;_

10        wherein said first data object is owned by one and only one of the plurality

11    of caches; and

12        wherein a ratio between primary content and secondary content in the first

13    cache is allowed to fluctuate.


1        92. (Previously presented) The method of claim 91, further comprising:

2        identifying one of the plurality of caches as the owner of said first data

3    object.

1          93. (Previously presented) The method of claim 92, wherein said
2    identifying comprises:
3          hashing an identifier of said first data object to produce a hash value; and
4          mapping said hash value to one of said plurality of caches.

1          94. (Previously presented) The method of claim 91, wherein said receiving
2    comprises receiving said first data object from said other cache in the plurality of
3    caches.

1          95. (Previously presented) The method of claim 91, wherein said set of
2    dynamic criteria includes a popularity of said first data object.

1          96. (Previously presented) The method of claim 91, wherein said set of
2    dynamic criteria includes a utilization of the first cache.

1          97. (Previously presented) The method of claim 91, wherein said set of
2    dynamic criteria includes a size of said first data object.

1          98. (Previously presented) The method of claim 91, further comprising:
2          removing a cached data object from the first cache;
3          wherein said cached data object is selected based on one or more criteria.

1          99. (Previously presented) The method of claim 98, wherein said one or
2    more criteria include popularity;
3          wherein said popularity is measured as one or more of:
4                a number of requests for said cached data object; and
5                a frequency of requests for said cached data object.

1       100. (Previously presented) The method of claim 98, wherein said one or

2  more criteria include validity.

1       101. (Previously presented) The method of claim 98, wherein said one or

2  more criteria include age.

1       102. (Previously presented) The method of claim 98, wherein said one or

2  more criteria include size.

1       103. (Previously presented) The method of claim 98, wherein said one or

2  more criteria include ownership.

1       104. (Previously presented) The method of claim 98, wherein said one or

2  more criteria include a cost of retrieving said cached data object from one of an

3  origin server and a second cache in the plurality of caches.

1       105. (Previously presented) The method of claim 98, wherein said one or

2  more criteria include a level of storage input/output activity at the first cache.

1       106. (Previously presented) The method of claim 98, wherein said one or

2  more criteria include a level of communication activity at the first cache.

1       107. (Previously presented) The method of claim 98, wherein said one or

2  more criteria include a level of processor activity at the first cache.

1       108. (Previously presented) The method of claim 91, further comprising:

2       propagating invalidation of said first data object between the first cache

3  and a second cache.

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1      109. (Previously presented) The method of claim 91, further comprising:

2      exchanging a configuration of the plurality of cooperating caches between

3  the first cache and a second cache.


1      110. (Previously presented) The method of claim 91, further comprising:

2      re-configuring ownership of the domain of data objects in response to the

3  removal of a cache from the plurality of cooperating caches.


1      111. (Previously presented) The method of claim 91, further comprising:

2      re-configuring ownership of the domain of data objects in response to the

3  addition of a cache to the plurality of cooperating caches.


1      112. (Currently amended) A computer readable storage medium storing

2  instructions that, when executed by a computer, cause the computer to perform a

3  method of caching a data object, the method comprising:

4      receiving at a first cache of a plurality of cooperating caches a first data

5  object of a domain of data objects;

6      if said first data object is owned by the first cache, storing said first data

7  object as primary content in the first cache; ~~and~~

8      if said first data object is owned by another cache in the plurality of

9  caches, determining on the basis of a set of dynamic criteria whether to store said

10  first data object as secondary content in the first cache; and

11      <u>if so, storing said first data object as secondary content in the first cache;</u>

12      wherein said first data object is owned by one and only one of the plurality

13  of caches; and

14      wherein a ratio between primary content and secondary content in the first

15  cache is allowed to fluctuate.

1        113. (Currently amended) A method of caching data objects in a plurality

2    of cooperating caches, comprising:

3        partitioning a set of data objects among a plurality of cooperating caches,

4    wherein each of said caches receives ownership of a subset of said data objects;

5        caching one or more data objects of a first subset of said data objects at a

6    first cache having ownership of said first subset;

7        caching one or more data objects of a second subset of said data objects at

8    the first cache as secondary content, wherein a second cache in the cluster owns

9    said second subset;

10        wherein a ratio between the first subset and the second subset in the first

11    cache is allowed to fluctuate;

12        receiving at the first cache a first request for a first data object in said

13    second subset of data objects;

14        receiving said first data object from the second cache; and

15        caching said first data object at the first cache only if said first data object

16    satisfies one or more of a predetermined set of criteria.


1        114. (Previously presented) The method of claim 113, wherein said

2    caching said first data object comprises caching said first data object if said first

3    data object has a threshold level of popularity.


1        115. (Previously presented) The method of claim 113, wherein said

2    caching said first data object comprises caching said first data object if the first

3    cache has capacity to cache said first data object without first removing another

4    data object.


1        116. (Previously presented) The method of claim 113, further comprising:

2          removing one or more cached data objects from the first cache, wherein a

3    subset of said set of criteria is used to select said one or more cached data objects.

1          117. (Previously presented) The method of claim 113, wherein said

2    predetermined set of criteria includes a popularity of said first data object.

1          118. (Previously presented) The method of claim 113, wherein said

2    predetermined set of criteria includes a validity of said first data object.

1          119. (Previously presented) The method of claim 113, wherein said

2    predetermined set of criteria includes a size of said first data object.

1          120. (Previously presented) The method of claim 113, wherein said

2    predetermined set of criteria includes an age of said first data object.

1          121. (Previously presented) The method of claim 113, wherein said

2    predetermined set of criteria includes a cost of retrieving said first data object

3    from an origin server.

1          122. (Previously presented) The method of claim 113, wherein said

2    predetermined set of criteria includes a measure of the utilization of the first

3    cache.

1          123. (Previously presented) The method of claim 113, further comprising:

2          receiving an invalidation message regarding said first data object at one of

3    the first cache and the second cache; and

4          communicating said invalidation to the other of the second cache and the

5    first cache.

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1        124. (Previously presented) The method of claim 113, further comprising:

2        automatically re-partitioning ownership of the set of data objects upon

3    failure of one of the cooperating caches.

1        125. (Previously presented) The method of claim 113, further comprising:

2        automatically re-partitioning ownership of the set of data objects upon the

3    addition of a cache to the plurality of cooperating caches.

1        126. (Currently amended) A computer readable storage medium storing

2    instructions that, when executed by a computer, cause the computer to perform a

3    method of caching data objects in a plurality of cooperating caches, the method

4    comprising:

5        partitioning a set of data objects among a plurality of cooperating caches,

6    wherein each of said caches receives ownership of a subset of said data objects;

7        caching one or more data objects of a first subset of said data objects at a

8    first cache having ownership of said first subset;

9        caching one or more data objects of a second subset of said data objects at

10   the first cache as secondary content, wherein a second cache in the cluster owns

11   said second subset;

12       receiving at a first cache of a plurality of cooperating caches a first data

13   object of a domain of data objects;

14       if said first data object is owned by the first cache, storing said first data

15   object as primary content in the first cache; and

16       if said first data object is owned by another cache in the plurality of

17   caches, determining on the basis of a set of dynamic criteria whether to store said

18   first data object as secondary content in the first cache;

19       wherein said first data object is owned by one and only one of the plurality

20   of caches; and

21        wherein a ratio between primary content and secondary content in the first

22    cache is allowed to fluctuate;

23        receiving at the first cache a first request for a first data object in said

24    second subset of data objects;

25        receiving said first data object from the second cache; and

26        caching said first data object at the first cache only if said first data object

27    satisfies one or more of a predetermined set of criteria.


1        127. (Currently amended) A method of caching data objects in a plurality

2    of cooperating caches, comprising:

3        partitioning a domain of data objects among a plurality of cooperating

4    caches, wherein a first cache receives ownership of a first subset of said data

5    objects;

6        caching one or more members of said first subset of data objects at the first

7    cache;

8        caching one or more members of a second subset of data objects at the first

9    cache as secondary content, wherein a second cache owns said second subset of

10    data objects;

11        wherein a ratio of members of the first subset to members of the second

12    subset is allowed to fluctuate and

13        removing a first cached data object from said first cache, wherein said first

14    data object is identified by applying a predetermined set of criteria.


1        128. (Previously presented) The method of claim 127, wherein said

2    predetermined set of criteria includes data object popularity.


1        129. (Previously presented) The method of claim 127, wherein said

2    predetermined set of criteria includes data object validity.

1      130. (Previously presented) The method of claim 127, wherein said

2      predetermined set of criteria includes data object size.


1      131. (Previously presented) The method of claim 127, wherein said

2      predetermined set of criteria includes data object age.


1      132. (Previously presented) The method of claim 127, wherein said

2      predetermined set of criteria includes data object ownership.


1      133. (Previously presented) The method of claim 127, wherein said

2      predetermined set of criteria includes a cost of retrieving a data object from an

3      origin server.


1      134. (Previously presented) The method of claim 127, wherein said

2      predetermined set of criteria includes a measure of the utilization of the first

3      cache.


1      135. (Previously presented) The method of claim 127, further comprising:

2          receiving at the first cache an invalidation message regarding a data object

3      cached in the first cache; and

4          communicating said invalidation of said data object to another cache.


1      136. (Currently amended) A computer readable storage medium storing

2      instructions that, when executed by a computer, cause the computer to perform a

3      method of caching data objects in a plurality of cooperating caches, the method

4      comprising:

5          partitioning a domain of data objects among a plurality of cooperating

6   caches, wherein a first cache receives ownership of a first subset of said data

7   objects;

8          caching one or more members of said first subset of data objects at the first

9   cache;

10          caching one or more members of a second subset of data objects at the first

11   cache as secondary content, wherein a second cache owns said second subset of

12   data objects;

13          wherein a ratio between primary content and secondary content in the first

14   cache is allowed to fluctuate; and

15          removing a first cached data object from said first cache, wherein said first

16   data object is identified by applying a predetermined set of criteria.


1          137. (Currently amended) A hybrid cache, comprising:

2          a cache engine configured to cache a first subset of a domain of data

3   objects, wherein ownership of said first subset of data objects is assigned to the

4   hybrid cache;

5          a monitor configured to monitor an operational status of the hybrid cache;

6          an administrator configured to facilitate administration of the hybrid

7   cache; and

8          communication links coupling the hybrid cache to one or more other

9   hybrid caches;

10          wherein said cache engine is further configured to cache a second subset of

11   a domain of data objects owned by a second hybrid cache as secondary content if

12   said second data object satisfies a set of dynamic criteria;

13          wherein a ratio between the first subset of data objects and the second

14   subset of data objects in the first cache is allowed to fluctuate.


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1    138. (Previously presented) The hybrid cache of claim 137, wherein said

2    domain of data objects is partitioned among the hybrid cache and the other hybrid

3    caches such that each said cacheable data object is owned by just one of the hybrid

4    caches.


1    139. (Previously presented) The hybrid cache of claim 137, wherein said

2    dynamic criteria include one or more of: popularity, validity, age, size, ownership

3    and cost of retrieving said second data object.


1    140. (Previously presented) The hybrid cache of claim 137, wherein one or

2    more of said cache engine and said monitor are configured to report the

3    invalidation of said second data object to the second hybrid cache.


1    141. (Currently amended) A cluster of hybrid caches, comprising:

2        a plurality of hybrid caches;

3        a set of data objects, wherein ownership of said data objects is partitioned

4    among said hybrid caches; and

5        a set of criteria for applying to determine whether to cache as primary

6    content at a first hybrid cache a data object owned by a second hybrid cache;

7        wherein each of said hybrid caches is configured to always cache a first

8    received data object that it owns and to apply said set of criteria to determine

9    whether to cache a second received data object as secondary content that belongs

10   to a different hybrid cache, and if so, store said first data object as secondary

11   content in the first hybrid cache;

12       wherein a ratio between primary content and secondary content in the first

13   cache is allowed to fluctuate.